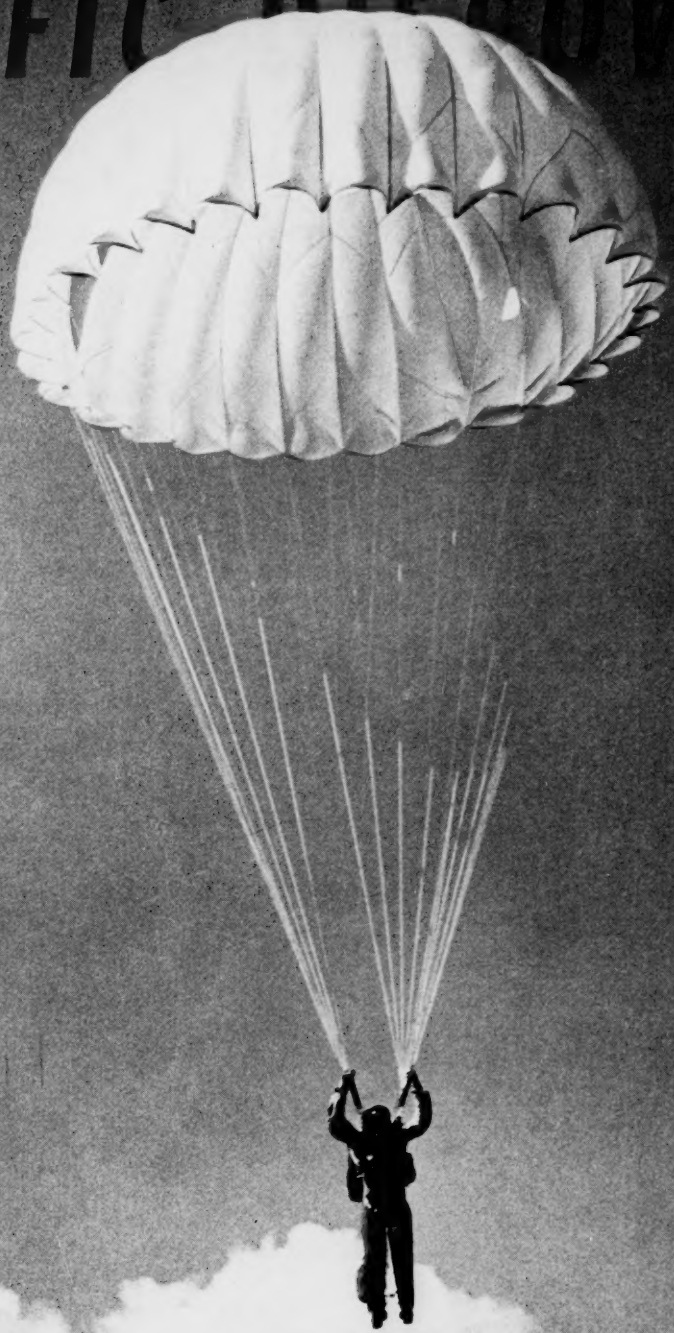
PACIFIC DISCOVERY



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A JOURNAL OF NATURE AND MAN **PACIFIC DISCOVERY** IN THE PACIFIC WORLD

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Vol. IV · No. 4
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IN THIS ISSUE

EDITORIAL: *Mountain Heights* 2

CONSERVATION: *Smokejumpers—The Quickest Way to the Fire*
ELLA E. CLARK 4

Ammonite Ravine and the "Horn of Ammon"
LEWIS W. WALKER 15

Elephant Seals Come Back!
GEORGE LINDSAY 18

Old France in the South Seas
LOUISA CLARK WILLIAMS 24

REVIEWS 30

PRE-DISCOVERY

CONSERVATION, when we hear the word, generally means to us the saving of our forests by not cutting trees, or more modernly, by cutting them wisely and replacing them by planting new forests. To the most zealous of us, conservation means keeping wildernesses virgin, even if it means keeping out of them all but the hardiest backpacking zealots for the trackless wild. To each, the meaning is tempered to the ax he grinds. Harry C. James' ax is double-bitted, and tempered for the conservation of man as well as nature. "Teachers, religious leaders, probation officers, social workers, all constantly ask me," Mr. James writes, " 'How can we best inculcate a spirit of reverence and develop a decent code of ethics in our young people of today?' My answer is, 'Get them out on the trail. Give them a chance to experience a little real wilderness camping.' I certainly realize that a true camping experience is not the answer to every problem in juvenile delinquency, nor will it fill every deficiency in character in every person; but I have seen what it can do for hundreds of boys in my thirty-five years of camping with them through the Western states.

"The primeval forest, the alpine heights, the desert wastelands, the endless sweep of ocean—from time immemorial these have challenged the best in man. They will continue to challenge the best in youth. Spirituality and morality are but latent in man, and I am confident that camping experiences in the wilderness serve most effectively to draw out these implicit character traits and make them dynamic—which is after all what true education should mean. The wilderness must, however, be unspoiled if it is to truly challenge, so my aim has ever been double—to give boys a wilderness camping experience and to fight to keep the wilderness inviolate." *Who hath smelt woodsmoke at twilight?* "It is the sacred incense of the high places of the earth"—the leader of the Trailfinders concludes thus his Conservation piece, next issue.

DISCOVERING PD'S AUTHORS

"SMOKEJUMPERS" have shown the U. S. Forest Service "the quickest way to the fire." The lookout on his, or her, mountain top is still one of the quickest ways to spot the fire and get a report to firefighting headquarters, though **Miss Ella E. Clark**, airminded veteran summer lookout, would readily agree that air patrols can see more ground at one glance and spot a tiny smoke over the ridge from a lookout. Perhaps this associate professor of English in Washington State College has seen from her summer post the Derry chutes floating down to nail that tiny smoke before it grew to a big smoke; she caught the enthusiasm for the new idea, at any rate, and went to their training station to get the jumping firefighters' story. ¶**Lewis W. Walker**, naturalist and author, has a home in San Diego, but you are more likely to find him, we judge, down Baja California way, poking around for those fossilized "horns of Ammon" in "Ammonite Ravine," or in some other odd place for odd things to write about. ¶We wonder whether Mr. Walker and **George Lindsay** will come as close this summer on the peninsula south of the border as they come in these pages. Telephoning us from Stanford University in June to discuss photographs for "Elephant Seals Come Back," Mr. Lindsay said he was about to leave on an expedition to Baja California. Since he is a botanist, we trust he will have another account of strange life—the peculiar desert plants of that region. ¶**Louisa Clark Williams** shares life afield with her research-entomologist husband, Dr. F. X. Williams, in Hawaii, in Africa, or in New Caledonia—"Old France in the South Seas" she aptly calls that Pacific island. While the Doctor probes and swings his net, she fills notebooks and takes pictures. Before they retired from Hawaii, she wrote a charming book about their pets, the talking mynah birds. The Williamses now live in California. D.G.K.

THE COVER COPY

Sliding down a sky pole by means of his Derry slotted chute, a youthful "smokejumper" of the Forest Service firefighting force answers an alarm in the Western timberlands. By opening or closing the slots with the guide lines, the jumper can steer his chute to the chosen landing spot. The photographer, also airborne, was Claude M. Bruce of McCall, Idaho.

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Mountain Heights

HUMAN HISTORY might not unreasonably be described as the story of man's effort to divest himself of the order of Nature and to pursue an irrational way of life. Coming into the world as the product of the eons of adaptation to environment, he has been busy for some thousands of years trying to adapt the environment to himself. The current result, while not unimpressive, is scarcely one to which he can point with unalloyed pride.

Faced with elemental need of shelter, he progressed from the cave to the tepee to the house of earth or wood or masonry, and after centuries of effort is able at last to offer himself the alternatives of living in an upstairs flat, a trailer, or a two-bedroom home costing thirty thousand dollars. Starting with firelight, torches, and candles, he developed artificial illumination to keep himself up at night; and starting with the burning rope, the sundial and the water clock, he invented the alarm clock to get himself up in the morning. More recently he has further complicated his living with daylight saving time, a transparent fiction by which he wilfully deceives himself into getting up an hour earlier than usual in order to have a longer evening in which to be tired.

It would doubtless be unreasonable to claim that the measurement of time, the discovery of fire, and the quest for shelter, have in general, or of themselves, been productive of evil. But it can hardly be denied that man has used the measurement of time to enslave himself to a schedule, to accelerate his pace, to give himself high blood pressure, and hasten his own undoing. The discovery of fire—an event of such importance that we commemorate it in the legend, centuries old, of Prometheus stealing fire from the gods—has given us the campfire, the hearth, barbecued spareribs, the automobile, and crêpes suzette; but it has also given us a disheartening assortment of explosives and incendiaries, together with jet planes to facilitate their delivery. The modern quest for shelter must take account not only of the elements but of man-made destruction raining from the skies. And man now looks forward hopefully to perfecting the H-bomb with which he will really be able to burn things up. It is doubtful that Prometheus, who is alleged to have incurred the wrath of Zeus and to have suffered considerable inconvenience in consequence of his effort to benefit mankind, would have approved of this.

The late William Savery used to maintain that all great philosophers have been pessimists. We shall not pause here to examine this premise in detail. Suffice it to say that all thoughtful men, whether great philosophers or not, and regardless of how cheerful their normal disposition, are likely to have moments of extreme discouragement with the human race. For these periods of bleak depression, when the irrationality of human behavior seems only to point up the futility of trying to do anything about it, we have a sovereign remedy: we take to the mountains.

Man, notwithstanding the artificiality with which he has surrounded himself, is deeply rooted in Nature, and when he turns to her he finds a quickening force. It is no accident that the summer vacation is traditionally spent in the out-of-doors; it is a response to an atavistic urge. Man is backtracking, retracing his steps, seeking something he has lost.

It is curious and interesting to note how perfect in detail this backtracking can be—like a movie film run backwards. One starts by loading the car, that emblem of twentieth-century western civilization, and drives as rapidly as possible toward his objective. He starts on a six-lane highway and, figuring that the cops will give him a five-mile-an-hour break, drives sixty or sixty-five miles an hour through the valley. Then the road gets narrower and the pavement is not so good; he slows down to forty and complains a bit. Presently the road gets steeper and more winding, and the curves a trifle precarious. It occurs to him that if he missed a curve it might be a thousand feet before he made a landing, and he concentrates on driving and doesn't complain about the pavement.

Presently, if this is a real vacation, he comes to a place where the car can go no farther. He parks this feeble appurtenance of civilization that demands the luxury of a paved highway, and with pack on back, starts up a mountain trail. Night falls, and finds him camped in a sheltered nook in the Sierra. There is no grocery store, no telephone, no neighbor within call. For this night he is completely on his own—primitive man against the universe. There is strength in that wilderness—strength that is needed to cope with it, and strength that the wilderness gives.

Comes the morning, he is awake at dawn—no daylight saving, no alarm clock. What wakened him? Was it the song of the hermit thrush, or the light breaking above the peaks of the high Sierra, or just the sense of primitive man that day is here, and he should be up and about his business? Morning comes easily when one gets up without compulsion.

The cares of yesterday seem far away and long ago as he sits there, half in and half out of his sleep-

Mt. Ritter and Banner Peak from near Garnet Pass. (Cedric Wright)

ing bag, the fragrance of pine needles in his nostrils, peaks he will never climb silhouetted against the eastern sky, the vast stillness broken only by the song of birds. Lines of poetry, half forgotten, come to mind, and he sorts them over, seeking something to express his mood. He settles on Edwin Markham's:

> Oft when the white still dawn
> Lifted the skies and pushed the hills apart,
> I've felt it like a glory in my heart.

It occurs to him that it is no accident that man's religious concepts, from primitive animism to those involving the highest ethical ideals, have so commonly been associated with mountain heights. To the American Indian these very peaks were sacred places. For the Greeks, the home of the gods was rugged, snow-capped Mount Olympus. Of Moses it was written, "The Lord called to him out of the mountain," and of Jesus, "He went out into a mountain to pray."

Dawn gives place to sunrise, and the snowy peaks are clothed in shimmering splendor. Mind and eye together leap from crag to crag, and thoughts come tumbling like a mountain cataract. "I love thy rocks and rills." *America* must have been written on a mountain height at morning. Where else, or under what circumstances, could anyone have thought of such a phrase as "freedom's holy light?"

One's thoughts turn to human freedom, man's priceless heritage, and to the struggle to maintain it against those forces, rampant in the world today, that would enslave both mind and body. Have we thought about freedom lately? Do we realize what freedom means? Are we willing to defend it with our lives, our fortunes, and our sacred honor? That is the way our forebears felt about freedom. Are we as sold on it as they?

> When Freedom from her mountain-height
> Unfurled her standard to the air,
> She tore the azure robe of night
> And set the stars of glory there.

Joseph Rodman Drake was a minor American poet who died at twenty-five; but with those four lines he took his place with the immortals.

Flag waving? Well, what's wrong with that? Are we so sophisticated and blasé that we cannot thrill to the American flag? Maybe we could do with a bit of flag waving. To our forefathers, freedom was not something they took for granted; it was something they had struggled for, and fiercely loved. We could well recapture some of that fine fervor. Perhaps indeed we have. No one complained of flag waving when the Stars and Stripes were raised on Iwo Jima, and Joe Rosenthal snapped a photograph that should be reproduced in every future textbook of American history as the twentieth-century version of "The Spirit of '76."

This resurgence of Americanism we comprehend, not as a narrow nationalism to serve our special ends, but as a resurgence of the love of freedom, in which America can lead the way. We must defend our own freedom—yes. But at the same time we believe in and hope for freedom for all men everywhere. "Proclaim liberty throughout all the land, unto all the inhabitants thereof."

> From every mountain-side
> Let freedom ring!

Castles in the air? "That is where they ought to be," wrote Thoreau. "Now put the foundations under them."

R.C.M.

SMOKEJU[illegible]S—THE QU[illegible]

ELLA E. CLARK

Dropping behind enemy lines—a parachutist of the U. S. Forest Service uses the Derry slotted chute because of maneuverability and slow descent. The enemy—forest fire. (Claude M. Bruce)

FROM THE FLYING FIELD, a group of smokejumpers and I watched two drift chutes leave the airplane. The spotter was timing them, the men told me, and watching the effect of the wind upon them. This was to be a practice jump; the procedure for all the men in the plane was to be exactly the same as it would be in the later fire jumps into the wilderness forests of Idaho, Wyoming, and Utah.

"Those test parachutes," the smokejumper foreman explained, "are built in the same weight proportion as a man and his chute, so as to fall at the same speed they do. That's about 1,000 feet per minute in normal atmospheric conditions. The spotter always drops the drift chutes first and watches them. Then he allows for the same angle of wind drift when he chooses the best landing place near the fire and when he directs the jumpers."

All of us on the flying field knew at least something about the feelings of the five young men in the air. We understood that restraining mixture of enthusiasm and dread, of thrill and fear. It had

HE QUICKEST WAY TO THE FIRE

kept them silent at breakfast, silent as they waited for the plane—except for one, usually the most carefree of them all, who kept repeating two lines of a hymn. They were about to do the dangerous thing they had spent days in preparing to do: they were going to make their first parachute jump from an airplane.

My own pulses quickened as the tune of the motor changed. A small brown object appeared below the plane, followed by a long white streamer. A parachute opened.

"Ol' Kaintuck is out all right," said the squad leader standing beside me. "I wonder if he is still singing his hymn."

The boy from across the continent had had a troubled night, for he had drawn the cut for the first jump in the first parachute practice jumping of the new squad.

Silently we watched while the other four novices, one by one, appeared as tiny dark objects below the plane. One by one the parachutes opened safely. Intensely white against the mountain-blue sky, they floated gracefully down until all disappeared from our view behind a line of trees.

"They'll be able to talk now," laughed one of the experienced jumpers. As the men put on their jumping suits, they reminisced about their own nervousness of one year and two years earlier.

On the landing field next morning, I watched the five boys make their second jumps, heard their instructor give them directions through a big megaphone, saw them manipulate the guide lines of their parachutes so as to land near their practice target—an orange-colored pad on the ground.

"It was all thrill this time," said the boy from the University of Michigan, his face beaming. He had almost touched the target.

"My heart and stomach stayed where they belong," another boy added with a grin.

Wishing to be sure of each stage of the jump, I said to them, "First you hook the static line of your parachute pack to the static line cable inside the plane. You sit in the door with your right foot on the step—then what do you do?"

"Pray!"

These young men had reached the climax of their first season of training for the Parachute Project of the U. S. Forest Service. They would make seven practice jumps; the men who had had previous experience jumping into the forest would make three, as part of their refresher training. When the fire season began, all would be ready to "get to a fire as quickly as possible."

"Smokejumping is done, not for the glamour of the thing, but as a method of quick transportation to the fire," said the supervisor of the Payette National Forest of Idaho. "To get to the fire as quickly as possible—that has always been our goal and that is the whole purpose of our parachute training."

With these words he had prefaced his answers to my questions about smokejumping and about the training of smokejumpers. I had become interested in the parachute project during the three war-time summers I was a forest fire lookout for the U. S. Forest Service in the Cascade Mountains of Washington. From one station at 8,140 feet altitude I looked down, for a brief period, upon rugged country which smokejumpers helped to protect—forested canyons and steep forest-clad slopes that it would take many hours to reach by

Fires are spotted by the mountain-top lookouts and by airplane and helicopter patrol. Smokejumping is a great safeguard to wilderness areas especially, where 70 to 90 per cent of the fires are lightning caused and often hard to reach over ground routes. This is Beaverhead National Forest, Montana. (U. S. Forest Service photos unless otherwise credited)

foot, hours in which a little lightning fire could become a big fire.

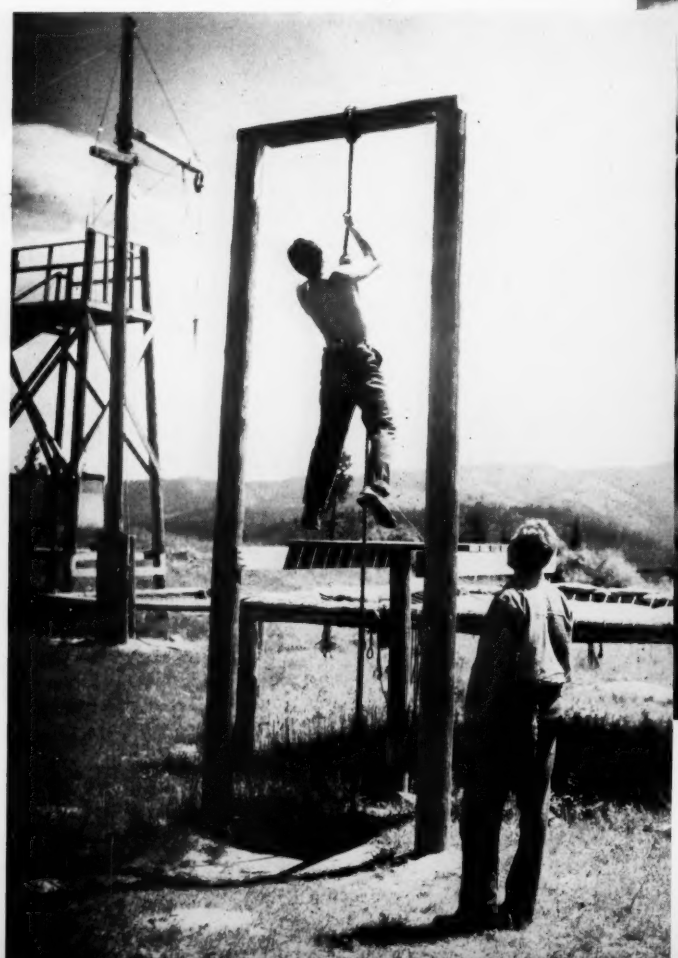
The Western states have many square miles of such forested wilderness. Smokejumpers of the United States Forest Service help to protect 11,000,000 acres of almost inaccessible forests in the Northern Rocky Mountain Region, 8,000,000 acres in the Intermountain Region of the central Rockies, and smaller areas in the Cascade and Siskiyou mountains near the Pacific Coast.

In these so-called "smokejumper zones," from 70 to 90 per cent of the fires are caused by lightning, in contrast to the United States as a whole, where 93 per cent of forest fires are caused by man.

Most of the timber in these mountainous primitive sections is too inaccessible to be merchantable; but as watershed protection the forests there are of incalculable value. Flood control, erosion control, water power and water supply, grazing for thousands of domestic animals as well as for wildlife, irrigation of thousands of farms, navigation on the Missouri, the Columbia, and the Snake rivers—all of them depend upon nature's best reservoir: a well-kept forest.

These wilderness forests are important also for beauty and for recreation. Certain of them were set aside in 1931 as roadless primeval areas, and their purpose was defined by the Chief of the Forest Service in these words: "To make it possible for people to detach themselves at least temporarily from the strain and turmoil of modern existence, and to revert to simple types of existence in conditions of relatively unmodified nature. To afford unique opportunities for physical, mental, and spiritual regeneration."

Since 1940, smokejumpers have been employed during the summer months to aid the ground fight-



Want to be a smokejumper?
Training is as tough as any in college football or the armed forces. The 23-foot practice jumping tower stands in the background, with frame of the landing net visible below it.

When you jump into the woods, obviously there's a fairly good chance you will land "up a tree." To meet this contingency beforehand, you train on the "let-down rig" wearing your jumping suit and full pack of gear. Hanging 25 feet above ground, you take the free end of your landing rope from its trouser-leg pocket, thread it through the harness rings, tie it to the imaginary chute above you; then you extricate yourself from the chute harness and lower away by the rope—all this in five minutes. Of course you try to miss that tree when you jump, and try for a "featherbed landing" in a thicket of seedlings.

ers in the control of fires in these regions. Beginning in 1947, they have been trained and stationed at four bases: 24 men at Caves Junction, Oregon; 45 at McCall, Idaho; 24 at Winthrop, Washington; 150 at the camp near Missoula, Montana. This largest group helps to protect not only the vast wilderness in Montana and northern Idaho but also, through arrangements with the National Park Service, jumps to fires in Yellowstone and Glacier national parks.

At these four camps young men between the ages of eighteen and twenty-eight, carefully screened from many applicants, are given three or four weeks of intensive training and conditioning in June and early July. Since the war, most of them have been veterans; a large proportion have been college students preparing for careers in forestry.

At McCall, I watched the young men, dressed in their jumping gear (see picture), receive practice in taking off from mock-planes built to resemble the planes used in the actual jumping; practice in jumping from doors at the top of a 23-foot tower, in landing on rough terrain in a re-

➔ Your fitted canvas jumping suit is well padded to protect you from the rocks often found on landing spots in the mountains. The wide collar guards your neck if you land in a tree, and a football helmet and fencing mask take care of your head and face. You wear heavy boots, and soft gloves for handling the parachute guide lines. The 75-foot let-down rope is in that baggy trouser-leg pocket, along with a roll of orange streamers for signaling. The automatic chute is in a back-pack; a hand-controlled emergency chute is always carried in a chest-pack —this item, you'll be glad to know, has never been used by Forest Service jumpers. (Claude M. Bruce)

➔ Your working gear comes down after you—shovel, Pulaski, food for three days, flashlight and extra batteries, first-aid kit, canteen, water bag, mess kit, file, paper and matches, all rolled in a bundle and tied to a pack rack. Sleeping bags are dropped in another bundle. (Jack Rottier)

laxed roll, in getting themselves and their parachutes down from a tree.

The jumpers had classes in fire suppression, first aid, the use of tools and equipment, the making of maps, and the other things which all Forest Service employees are taught in order to carry out Rule Number 1 in the forest: SAFETY FIRST. On the "obstacle course," which smokejumpers themselves had built, they had the vigorous conditioning exercises they need in order to jump safely into the wilderness. Neither on the football field nor in the army, college boys told me, had they been given a harder workout.

A Forest Service movie and conversations with squad leaders during their rest periods made clear the routine of smokejumpers when they arrive at a fire. Usually they are sent to a small fire which two men can extinguish. One man is never sent alone. After jumping to the landing spot which the spotter or squad leader has selected for them, they signal to him, get out of their jumping suits and protective gear, stow them and their parachutes in a safe place, pick up the fire-packs which have been dropped from the plane, and start towards the fire. Each fire-pack contains fire-

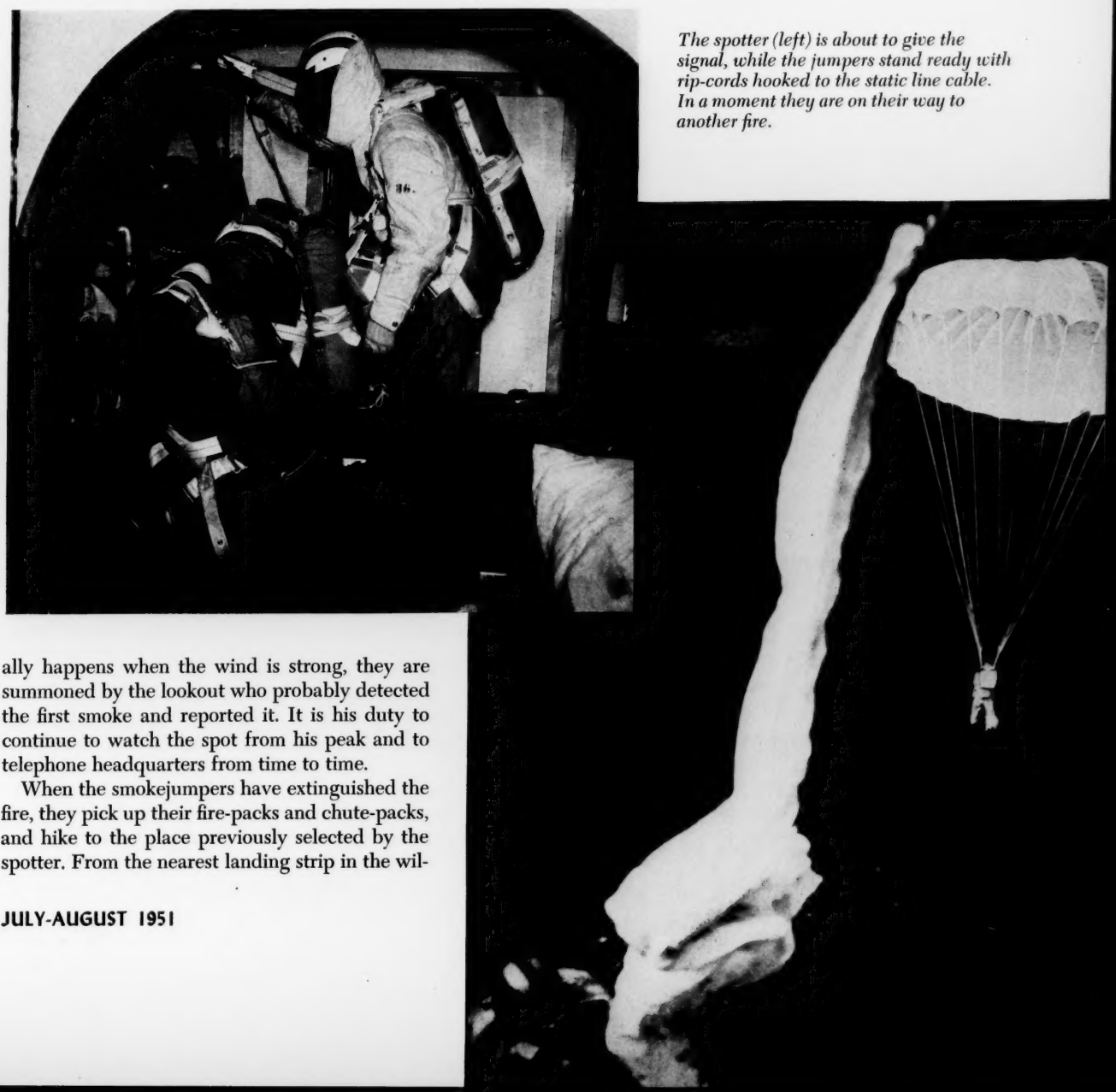
suppression tools, food rations, a sleeping bag, sometimes a two-way radio.

When they reach the fire, they proceed just as we lookouts were trained at Fire Guard School: First examine the fire and plan the attack. Dig a trench around it in order to keep it from spreading through the dry needles and leaves, throw dirt on a ground fire, knock down the flames as they try to climb, dig down to the mineral soil below the duff, and throw the mineral soil on the fire. With the shovel, turn everything in the fire spot over and over until it can be handled without gloves. No fire is out until dirt and ashes can be picked up with bare hands.

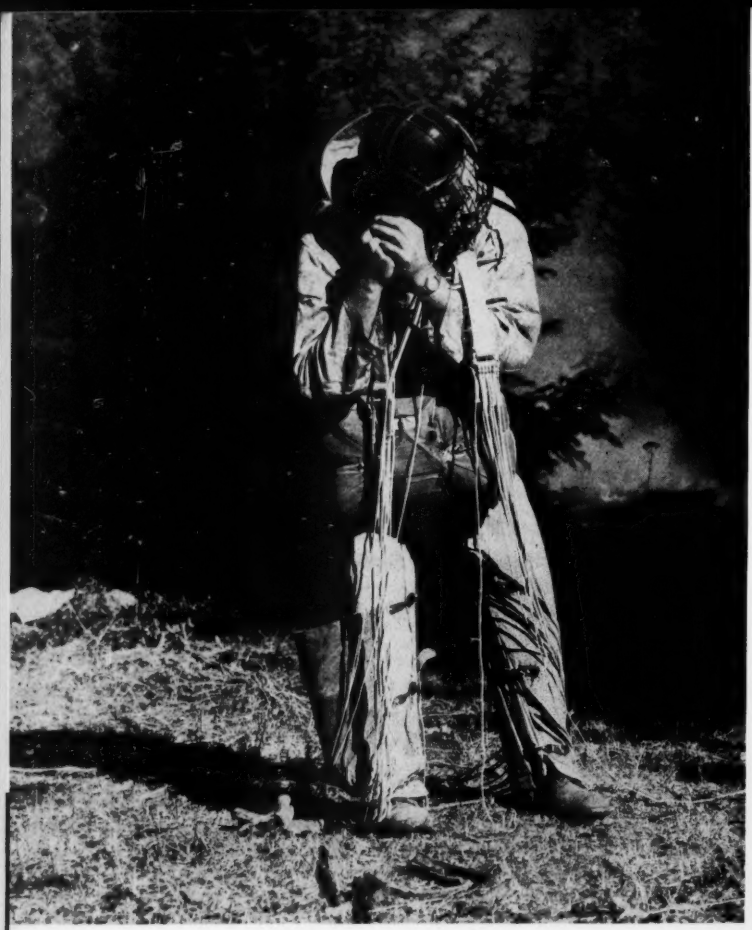
If more men are needed on the fire, as occasionally happens when the wind is strong, they are summoned by the lookout who probably detected the first smoke and reported it. It is his duty to continue to watch the spot from his peak and to telephone headquarters from time to time.

When the smokejumpers have extinguished the fire, they pick up their fire-packs and chute-packs, and hike to the place previously selected by the spotter. From the nearest landing strip in the wilderness area or from the nearest road-head in other areas, they are taken back to base by plane or truck.

The eleven-year-old parachute program developed out of other phases of aerial warfare against fire which had begun shortly after World War I. Then the Forest Service and the Army Air Corps, at the suggestion of the Chief Forester, coöperated in organizing an aerial patrol, first in California and later in Oregon, Washington, Idaho, and Montana. Aerial photography developed rapidly, and cargo dropping gradually became an efficient means of supplying firefighters in the roadless areas. Also experiments were begun with water bombs and chemical bombs for fire suppression.



The spotter (left) is about to give the signal, while the jumpers stand ready with rip-cords hooked to the static line cable. In a moment they are on their way to another fire.



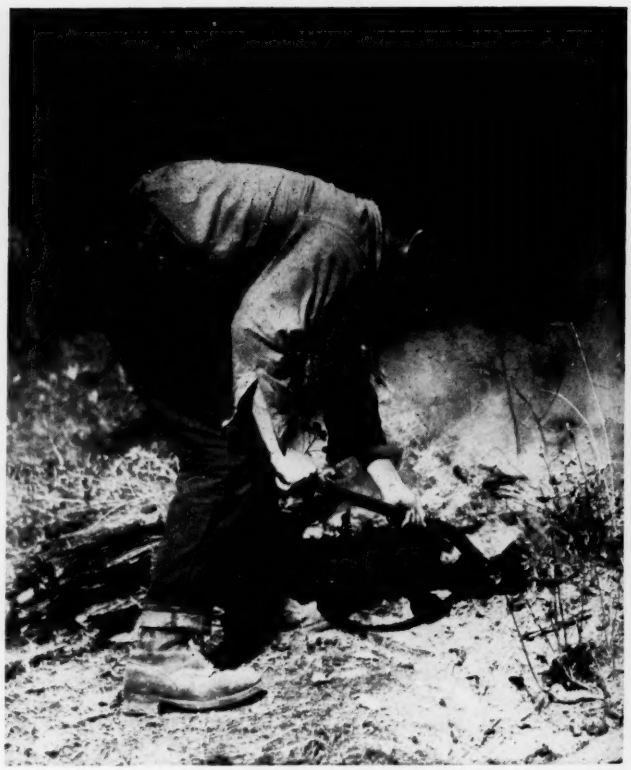
In 1934 T. V. Pearson, recently retired from the national offices in Washington, D.C., then in the office of the Intermountain Region (Region 4) at Ogden, Utah, suggested dropping firefighters by parachute.

"I was in the Ogden office at the time," the supervisor of the Payette Forest told me. "I'm almost ashamed to admit it, but the rest of us laughed at the idea. We thought parachuting entirely too hazardous to be considered seriously."

That same year an inventor by the name of J. B. Bruce claimed that he had developed a parachute that could be used safely for dropping men into timbered country. Some experiments with parachutes were made in the Ogden area the following spring, under the direction of Mr. Pearson. Dummies the weight of men were dropped; then men were jumped, to confirm the conclusions made by the dummy tests. But because almost everyone at the time considered parachuting to be very dangerous and parachutists to be publicity-seeking daredevils, no large-scale experiment with parachutes was undertaken.

Four years later, however, it was decided to abandon the aerial fire bombing experiments and to use the remaining funds for experiments in the transportation of firefighters by airplane and parachute. This decision was reached largely through the efforts of the late David P. Godwin, then Assistant Chief of the Division of Fire Control in the U. S. Forest Service. He fathered the smokejumping project during its early years.

In the autumn of 1939 an experiment was conducted near Winthrop, in the Chelan National Forest of north-central Washington, by the Eagle Parachute Company of Lancaster, Pennsylvania, under a contract with the U. S. Forest Service. A number of dummy tests were made, and then sixty jumps by employees of the company. The best equipment for timber jumping was determined. After a month's experimenting, several Forest Service employees jumped into both open



Hitting the ground, the firefighters get out of their harness and jumping suits, then study the fire to find out, if possible, what caused it, and to plan the best attack. Then they shovel a trench around it to keep it from spreading along the ground. They clear away roots and brush to get at the mineral soil under the humus to throw on the fire. Soil and burning stuff must be turned and mixed until the stuff is cool enough to pick up with bare hands. It is hot, dirty work.

field and timbered areas. There were no serious injuries, and the men reported that they felt less fatigue after a jump than after a short hike up a steep hill.

The results in the Chelan Forest were considered so satisfactory that in 1940 small groups of smokejumpers were organized both in the Northern Rocky Mountain Region (Region 1) and in the North Pacific Region (Region 6). In the squad for Region 6 were the forest guards who had jumped during the experiment in the Chelan Forest. The training of both groups was supervised by Frank Derry, technician of the Eagle Parachute Company.

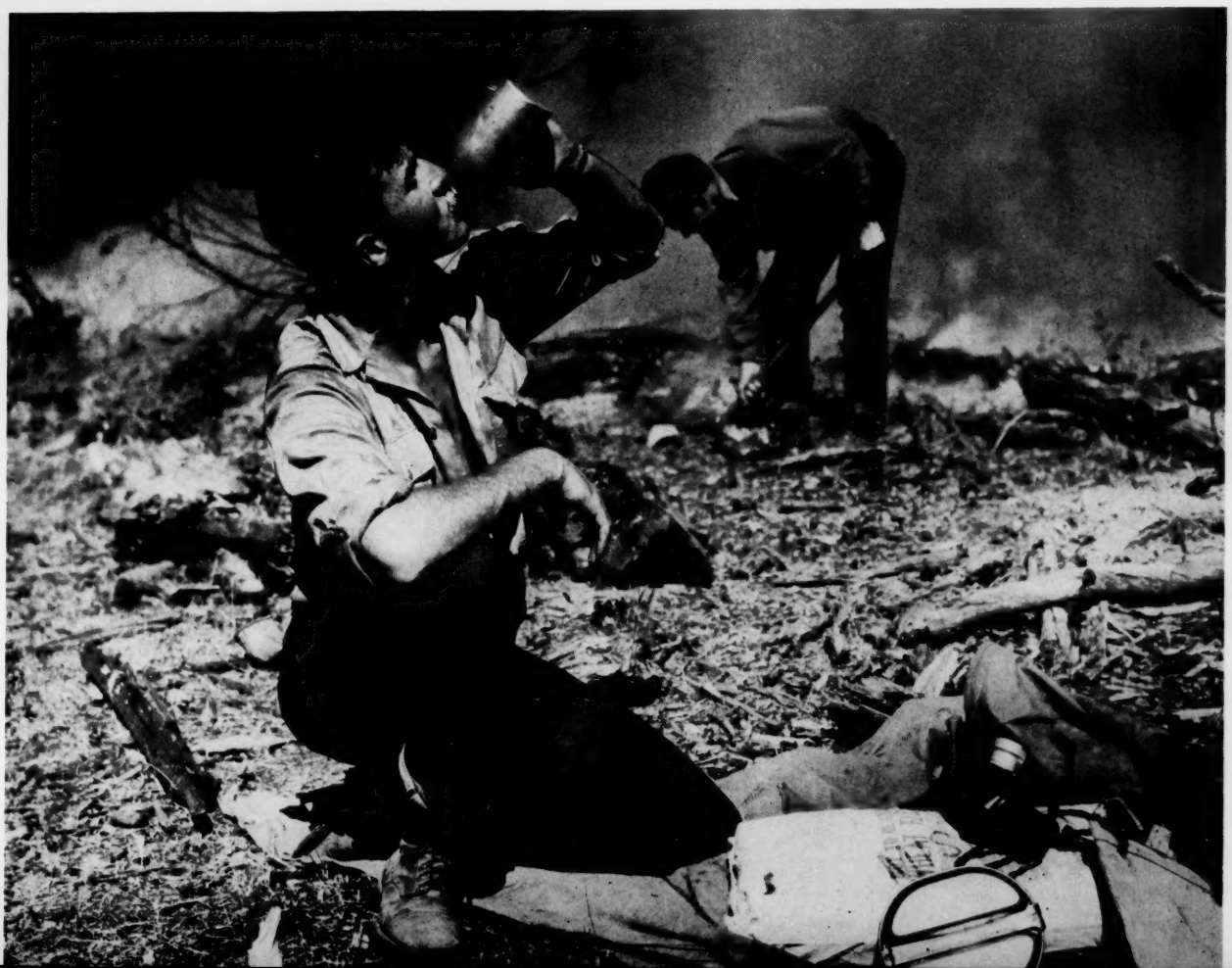
On July 12, 1940, Rufus Robinson of Kooskia, Idaho, and Earl Cooley of Hamilton, Montana, jumped by parachute to a fire in the Nez Perce National Forest of northern Idaho. During the summer, jumpers were dropped, without injury, to nine selected fires in Region 1 and to two in Region 6. When the fire suppression costs were analyzed, it was learned that the net saving on the nine fires in Region 1 was approximately $30,000 —nearly three times the cost of the smokejumping project.

Another event of 1940 brought unexpectedly far-reaching results. In June, four U. S. Army staff officers visited the parachute training grounds near Missoula. One of them, Major William Cary Lee, later used the techniques of the Forest Service in organizing the first paratroop training at Fort Benning, Georgia. He became the first Chief of the Airborne Command and is considered the father of the United States paratroop program.

In 1941, only the North Pacific Region had any serious outbreak of fires. That summer, for the first time, jumpers were dropped to check a fire which had escaped from the ground forces. Jumpers were sent to nine selected fires, again with an estimated net saving of more than $30,000.

These figures refer only to the saving in man-hours of labor in fire suppression. Jumpers can now reach, in minutes, a place which ground crews can reach only after hours, or sometimes days, of fatiguing travel. The estimated saving does not include the incalculables: the timber saved, the humus not burned, the maintenance work of the Forest Service not interrupted by having every man out on a big fire.

In the summer of 1942, war hampered develop-



This small fire is beginning to crown—lower branches have caught from the ground fire and flames are shooting up a tree. It may become a bad crown fire calling for more men and equipment to prevent a real holocaust. In most cases, jumpers stop them on the ground.

ments in the parachute program. For its paratroop program, the Army had called up all the trained parachutists except five for whom the Forest Service requested and obtained exemptions or deferments. Furthermore, only a few of the thirty-three men in training had had experience in fire-fighting, and before the end of the season some of them were called into military service. Fortunately, the season was wet. But in September, lightning fires in the Bitterroot and Nez Perce forests kept all the remaining jumpers parachuting as fast as they could be retrieved and their equipment repacked.

By 1943, there were again only five experienced men to form the nucleus of the jumping squad; and the Forest Service, even with considerable effort, could recruit only four others. But several conscientious objectors to war, desiring work which involved physical risk, made inquiries. Volunteers were solicited from the Civilian Public Service camps, and the C.P.S. parachute program was organized. From three hundred conscientious objectors who volunteered in 1943, sixty were selected and trained at the camp near Missoula. The North Pacific Region and the Intermountain Region sent fire-control men there to be trained as squad leaders of the conscientious objectors who would be assigned to them later. C.P.S. men were the smokejumpers again in 1944 and were a large proportion of the squads in 1945.

By 1944, the experimental period was over. That season, for the first time, the smokejumpers were considered an integral part of the fire-suppression organization. Several forests decreased the number of their ground forces and protected certain areas entirely with smokejumpers.

The values and the increased use of the parachutists can be seen from a series of figures. In 1944, they handled more than 100 fires in the three Northwest regions. In 1945, they were used on 269 fires, in the forests of the Northwest and of California.

In 1946, they jumped to 320 fires, with an estimated saving to the taxpayer, in suppression costs alone, of $545,000. In 1949, the fire season was unusually severe because of many lightning fires and much wind. The parachutists jumped to 354 fires, made 1335 individual jumps, and effected savings of more than $900,000. Between their work on many small lightning fires, they were kept busy dropping supplies from the air—tools, equipment, hot meals, hot coffee—to the hundreds of men fighting the big fires in Idaho and Montana.

During the light fire seasons of 1947, 1948, and 1950, the smokejumpers provided needed manpower in the constructive work they help with

every summer before the fire weather begins. This includes such varied projects as insect control, timber sale administration, reforestation, landscaping, construction and maintenance of trails, roads, camps, buildings, and other forest improvements. While assisting with this important work, which seldom reaches the newspaper headlines, the young men gain valuable experience for their future careers in forestry.

During these post-war years, the smokejumping project has been extended beyond the three Forest Service regions of the Northwest. In 1947, the Provincial Forest Service of Saskatchewan developed a parachute program after consultation with the forest officers in Region 1. Smokejumpers across the border were trained by a Canadian who had been trained at Missoula as a rescue jumper during the war.

Each spring since 1947, a smokejumping squad from Missoula base has spent about two months in the Gila National Forest in New Mexico, for use on lightning fires in the primitive areas there. The officials of that region have now approved of the smokejumping project "on a semi-permanent basis."

Originally intended only for fires in roadless forests difficult for ground forces to reach, the jumpers are now used sometimes in accessible areas where the timber has high economic importance and, as in the national parks, where the forests have high recreational and scenic importance. They are sometimes sent to a big fire that cannot be reached quickly by foot, to keep it from spreading while the ground forces are on their way. But their chief use yet is on small fires which two men can handle.

During these eleven years of smokejumping activities, the area burned annually has been greatly reduced. Other factors, of course, enter into the reduction—better coöperation from the public, seasonal differences, better equipment for fire-fighting, better training of the men. But smokejumpers have contributed much to decreasing the areas burned in the forests protected by the Forest Service. In this seven-year period from 1928 through 1934, an average of 299,000 acres was burned annually. In the seven-year period from 1942 through 1948, after the smokejumper units were organized, the annual average was 7,002 acres, a decrease of nearly 222,000 acres.

Every year some improvements in equipment and some developments in technique have been made, both at the experimental station near Missoula and also by foremen and jumpers at the three other bases. In 1941, for instance, the hand-controlled rip cord on the parachute was done away with, and a device was added to the backpack which causes the chute to open automatically. Only the emergency chute in the chest-pack is now pulled by hand, and the nervous tension of the jumpers has been greatly reduced.

In 1942, a parachute with two slots was first used; the maneuverability and slow rate of descent of this Derry slotted chute make it better than the Army chutes for use in timbered areas. In 1944, a change in the method of guide-line attachment permitted a faster and easier manipulation of the canopy. In 1947, a tailed parachute was found to be even more maneuverable; the tail, made of three panels attached to the perimeter of the parachute, acts as a sail and so increases the forward speed.

Training equipment and techniques also have been improved. All these changes have made smoke-chasing by parachute safer for the men and more economical and efficient in the forests. Until the summer of 1949—when nearly 10,000 individual jumps had been made in Region 1 alone—there had never been a death or a permanent injury among Forest Service parachutists. In Mon-

The job often ends with a long hike back to base.

tana that season, a group of smokejumpers, in danger because of a sudden and freak shift in the wind, followed a panicky mate instead of the directions of their experienced foreman, and so rushed to their deaths in the fire and smoke.

One important problem in the most efficient use of parachutists in the forests remains to be solved —the slow return of the jumpers after they have extinguished a fire. Often they have to spend much more time getting back to base than they spent in getting to the fire and putting it out; and if they have had the 27-mile hike over rugged country that one jumper told me about, they are too fatigued to fight another fire immediately. Fewer parachutists would be needed if they could get back quicker.

Retrieving smokejumpers by helicopter was first considered seriously in 1947. The Forest Service and the Army Air Rescue Service had already coöperated in experiments to determine the load-carrying capacity of helicopters, under varying wind and temperature conditions and at various altitudes. During the last four summers they have experimented with picking up smokejumpers in the back-country areas and taking them to places of immediate access.

These experiments may be the beginning of another story, or of the next act in the age-old drama of man's struggle against the forces of nature. The story of the smokejumpers is already drama on a big scale, appropriately enacted on the stage of the remaining forests of our land.

Yet it is never enacted for the drama. Firefighters are dropped by parachute for the simple reason—as the chief of the Forest Service's Fire Research Division said—that "a few men can control a forest fire when it is small. But an hour's delay may so increase its size and momentum that the efforts of fifty men are futile. Prompt action is the essence of forest fire control." END

LEWIS W. WALKER

Ammonite Ravine and the "Horn of Ammon"

SAN DIEGO WAS FOUR HUNDRED MILES to the north over the roughest and dustiest of roads when "Chappo," our Mexican guide, directed the command car toward a small dry gully. On three sides an eroded area was surrounded by high flat-topped plateaus while to the west the sunlight glinted on a wide expanse of the Pacific Ocean.

To the casual glance there was nothing unique about the region. It was typical Viscaino Desert with elephant trees, cardons and cireo cactus as the dominant vegetation and, aside from dark brown spherical objects resembling tremendous geodes, there was no sign to tell us that this was the site of one of the finest deposits of *ammonites* in the world. It was a veritable treasure trove of fossil mollusks. Although discovered a half century ago, the region had remained so inaccessible that even scientists had rarely visited it since.

These brown objects, concretions, which varied from coconut size to balls five feet across were unlike the usual crystal-studded geodes, for these were solid through the center with each one containing a fossilized animal of a past age.

According to geological calendars, these giant ammonites which lured us to the region had become extinct about seventy million years ago, and for about seventy million years before their demise they had been fighting a losing battle with more adaptable creatures that slowly usurped their dominant place in nature.

As the shell inmates died, their bulky coverings rolled around on the ocean floor, many, no doubt, disintegrating. Some, however, became buried in the primeval ooze and were thus protected by a blanket of mud. Throughout the years immediately following this interment, water worked through the soil and dissolved the limes of the hidden shells. This was then carried in solution into the surrounding layers of mud where it hardened and formed, perhaps with added material from other sources, the stony tombs that were now before us.

Then years passed, millions of them. Dust storms, lava flows, floods, and the sedimentary deposits of rivers covered over the hidden animals to depths of a thousand feet or more. And all during this covering there was a constant change taking place far beneath the earth's surface. Through mineralization stone was replacing animal form, creating a facsimile in rock that preserved the minutest details.

Now as fossils, most ammonites still remain buried under tons of debris but in a few localities throughout the world, such as this spot in Baja California, the elements that caused them to be covered began working in reverse. A constant succession of wind, water, and earthquakes all combined to erode one geologic layer after another. Finally, some of the balls of lime-impregnated mud were exposed to the light of day and, being harder and heavier than the surrounding soils, remained to litter the ravine bottom or stud the arroyo walls.

Although snail-like in appearance, these fossil ammonites were actually related to the present day chambered nautilus, and that animal as it now exists is their only living counterpart. In life the ammonites must have been sluggish creatures without the agility of their existing shell-less relatives, the octopi and squid, and in the latter part of their era the heavy armor probably became a hindrance to the procurement of foods. Their extreme size could also have worked against survival, as a small animal can subsist on little in times of famine or a fractional part of a lot in times of plenty. But a large animal must always have ample food for subsistence.

The shells of primitive cephalopods were remarkably well developed for a life in the water and contained a series of gas or air chambers to give buoyancy despite size and weight. But in the ages of their existence there were tremendous land upheavals when mountain ranges and perhaps even continents were being formed. Tidal waves and surging currents were perhaps commonplace, and against such forces buoyancy linked with size was probably a distinct disadvantage. Smaller animals could hold their own in rocky crevices while heavy ones would be secured by their own weight. These bulky but light ammonites, on the other hand, were subject to the whims of the waters. Many of the present accumulations of fossils are no doubt the result of their being stranded in landlocked bays where gradual evaporation forced even greater concentration and finally death.

Cephalopoda, name of the molluscan class that includes cuttlefish, squid, and octopi as well as ammonites, means *head united with feet*; but the "feet" of the ammonite were actually a mass of flexible tentacles equipped with suction discs to

A rough, winding road led to a cactus-studded gully–

hold its prey. They were probably used to pull the animal along the bottom when the shell was supported by water, but were far too weak to help traverse the barrier reef of a tide pool.

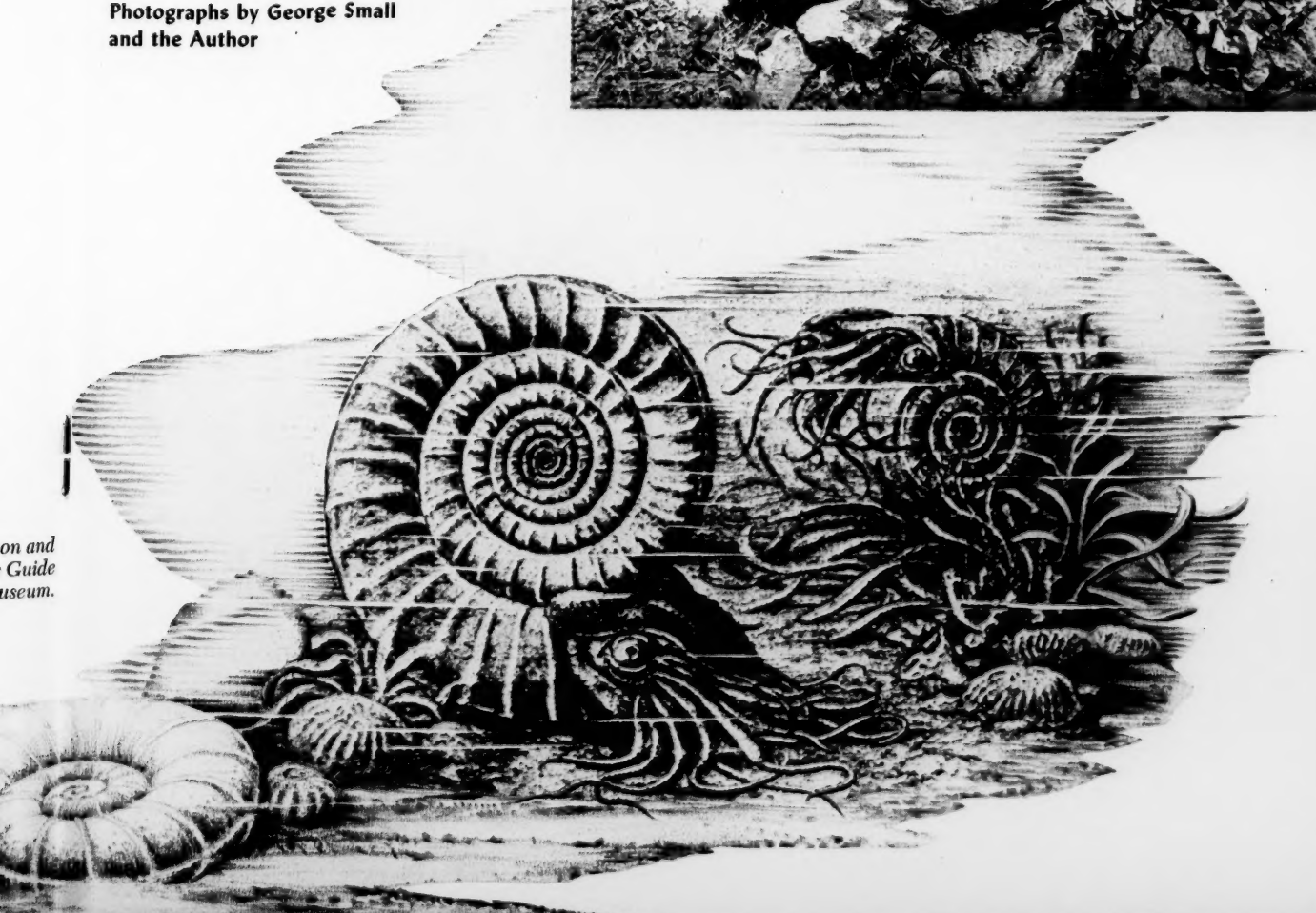
The octopus and squid of the present move by jet propulsion, and the ammonites of the past probably used a similar form of power when swimming free of the ocean bottom. Whether they, like their present day descendants, were capable of discharging ink as an underwater smoke screen has not been determined, but it is not improbable. All in all, ammonites must have been awesome creatures. If they had survived to the present day as living animals instead of becoming extinct fossils, those tall tales of the Loch Ness sea serpent would be overshadowed by a competitive yarn—the tale of a five-foot jet-propelled tank equipped with ink squirters and suction-cupped tentacles that roamed the ocean bottom on the lookout for the unwary. END

George Small probes for a fracture point on one of the exposed ammonite geodes.

Drawing after Pirsson and Schuchert, from Fraas's Guide to the Stuttgart Museum.

—and one of the world's chief deposits of ammonites, relative of the octopus and squid, extinct for seventy million years. They were named as early as 1732, a time when fossils were considered minerals, from their resemblance to a ram's horn, an attribute of the Egyptian god Ammon. In India the shells are used in certain religious rites.

Photographs by George Small and the Author



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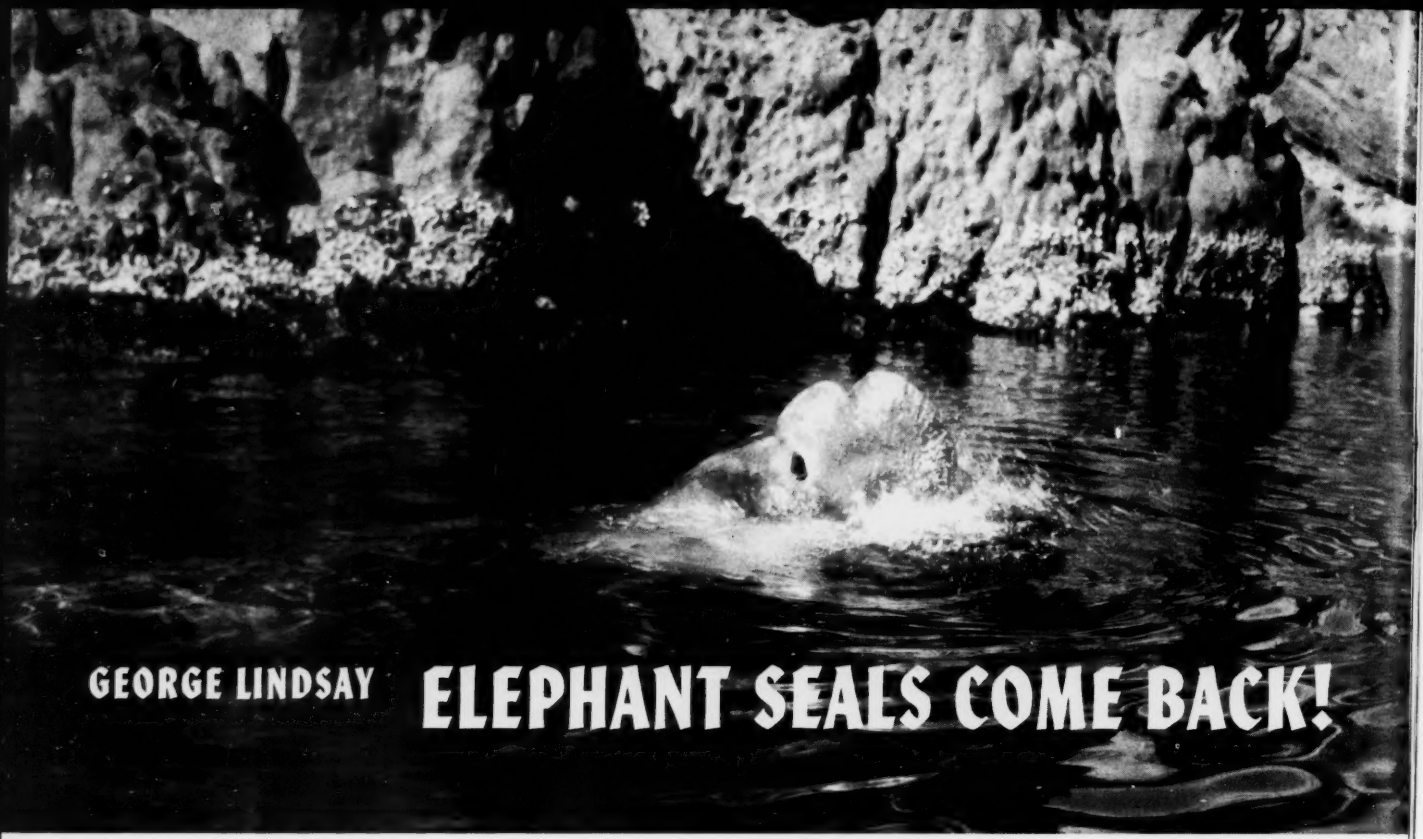


GEORGE LINDSAY

ELEPHANT SEALS COME BACK!

ONE DAY SOON, California bathers may be startled to find a favorite beach occupied by roaring, snorting sea monsters! It will make a good story for the press and will indicate a triumph for conservation; it will mean the return from virtual extinction of a unique and wonderful sea mammal, the elephant seal.

Elephant seals, or sea elephants, are coming back. Once they inhabited insular and coastal beaches from Point Reyes, near San Francisco, to Cape San Lazaro, just north of Magdalena Bay in Baja California. The docile and phlegmatic nature of the beasts, coupled with absolute lack of timidity toward man, made them easy prey for whalers in the early 1800's. Seal oil was valuable, and the herds of giants were massacred wherever they were found. They were not harvested as a crop—rather whole rookeries were exterminated for the try-pots. Records show they were still being killed commercially on Santa Barbara Island as late as 1852, but a decade later they had been reduced to a few small groups on isolated beaches far down the Mexican coast. Even there they were relentlessly pursued, and in 1869 Capt. C. M. Scammon reported them "nearly, if not quite, extinct."

Scammon's account of the slaughter is graphic, though chilling. Sailors armed with iron-headed clubs and lances got between the herd and the beach. If the bulls chose to give battle, they were dispatched with a musket ball in the brain, or as one reared back in characteristic fighting posture, a lance was thrust into the roof of its mouth. This caused it to settle back, and the sailors could club it into insensibility. Retreating before the hunters, the animals were forced back against the cliffs where they were clubbed to death or were smothered by each other's weight. The thick layer of blubber lying just under the skin was cut into chunks called "horse-pieces," about eight inches wide and twelve to fifteen inches long. These were strung on ropes, dragged through the surf to small boats, and towed to the whaler. There the oil was tried out in iron pots set in a brick furnace.

The wholesale slaughter ended with the depletion of the herds, but the few surviving individuals continued to be hunted. In 1884, Charles H. Townsend was with sealers who spent two months hunting at San Cristobal Bay, but during that time they found and killed only sixteen elephant seals. A concentrated search of the animal's old haunts,

A large bull elephant seal watches over his harem.

One sea elephant was known to survive sixty years ago—
today they are coming back to California's beaches

even of Guadalupe Island, failed to reveal others. Then in 1892, Townsend again visited Guadalupe Island where eight elephant seals were found, seven of which were killed. At least the skeletons and hides were saved for museum purposes. As the Baja California coast and islands were then periodically visited by parties hunting sea lions for hides and oil, it seemed improbable that any elephant seals could survive.

Fortunately a few had escaped, and for some years they were allowed to live and propagate in their redoubt area on inaccessible Guadalupe Island. In 1911, Townsend returned on the *Albatross* to find about 125 animals at Elephant Beach, on the northwest side of the island. This marked the first increase in the elephant seals' numbers since their slaughter had begun, and the increase has continued steadily until today. In 1922, an expedition jointly sponsored by the California Academy of Sciences, the San Diego Society of Natural History, and the Scripps Institution for Biological Research visited Guadalupe aboard the Mexican fisheries boat *Tecate*. The breeding season was over and they found only adult male elephant seals, but those numbered 264. Upon the return of the expedition, reports were submitted urging the Mexican Government to enact legislation to protect the animals. President Obregon declared Guadalupe Island a government reservation. Unauthorized landing on the island and the killing or molesting of the seals were prohibited. These protective measures are still in force today.

The increase since the low of one known animal in 1892 has been remarkable. Ever-growing herds reoccupied all the suitable beaches of Guadalupe. The population continued to expand, and the San Benitos Islands, 199 miles east of Guadalupe and just west of Cedros, was the scene of the first recolonization. Occasional individuals were observed there as early as 1928, and since then larger and larger groups have been using the Benitos. In February of 1950 we observed over one thousand animals scattered in breeding colonies on every beach of the San Benitos group.

Photographs by the Author

The elephant seal is a wanderer over the open ocean. Mr. Egmont Z. Rett of the Santa Barbara Museum of Natural History reported an elephant seal on San Miguel Island in 1926, and in 1945 he saw two on San Nicolas Island. In 1929, sword-fish fishermen killed one in the open ocean about forty miles off San Diego. This specimen came into the hands of Laurence M. Huey of the San Diego Museum of Natural History, who made a diagnosis of the stomach contents of the animal. The food of these creatures had been a mystery because the stomachs of the animals killed at the breeding grounds were always empty. The stomach of the animal Huey investigated contained seven ratfish, one California dogfish shark, one swell or puffer shark, three skates, and four squid. These contents indicated that the seal descends to great depths in feeding, for as Huey noted, the ratfish, the principal item of food, is most often found from 50 to 120 fathoms down. Also, it is important to note that none of the fishes used for food by the elephant seal are of commercial importance.

In April 1929, Dr. George A. Bartholomew of the University of California at Los Angeles took a group of students to the Coronados Islands, just 18 miles south of San Diego. There the students were surprised to find a herd of 73 elephant seals established in a sheltered cove on the west side of South Coronado, which is but a few miles from where the animals used to haul out on the Silver Strand. What an attraction it would be if they should reëstablish themselves at the State Beach Park now located on the Silver Strand! Dr. Bartholomew found a large herd on San Nicolas Island in May, June, and July 1949; in April 1950, 168 animals were counted. As with the group on the Coronados Islands, the elephant seals were sub-adult and could not be considered a breeding colony. On a trip to San Miguel Island in the summer of 1950, however, members of the staff of the Santa Barbara Museum of Natural History found

A big breeding colony of many harems on the northeast side of Guadalupe Island. Dr. George A. Bartholomew, the lone human counting them, got an estimated total of sixteen hundred animals.

OPPOSITE PAGE: *A typical small, isolated harem, with a large bull in the middle foreground.*

a group of over 50 elephant seals established on that island. Many of these were fully adult.

It thus seems reasonable to believe that some of our California beaches may soon again be used by resident herds of elephant seals. These animals are unafraid of man, and unless molested they probably wouldn't object to sharing beach rights with bathers! The huge creatures are of great interest and would be a most important natural history asset.

It has twice been my privilege to visit Guadalupe Island where I was intrigued by the unusual habits and actions of elephant seals. In April 1948 Reed Moran, Mr. and Mrs. Louis Cavanaugh, and I visited Guadalupe in the Cavanaughs' ketch, the *Marviento*. In late January of 1950, Mr. J. W. Sefton, Jr. invited me to accompany a group of scientists on an expedition to Guadalupe aboard the Sefton Foundation research ship *Orca*. Among those making the trip were Dr. George A. Bartholomew, who made a comprehensive habit study of the elephant seals which is to be published in the near future, and Dr. Carl L. Hubbs, of Scripps Institution of Oceanography, who studied the endemism in the fish of this oceanic island.

Perhaps the first thing that strikes a visitor to an elephant seal beach is the size of the beasts. The adult bulls average about 16 feet in length and weigh nearly three tons. Larger specimens have been reported; Scammon mentioned one 22 feet long. The mature males have a snout, or trunk, about 16 inches long which is flexible and pendant when the animal is not excited and which gives it an elephantine appearance. It serves no useful purpose that we could see, though the Mexicans declared it is used to probe rocks in search of food. The male makes a characteristic snorting or roaring noise by opening his mouth wide, folding the tip of his proboscis into the mouth, and exhaling air in short blasts. The resulting sound is resonant and can be heard far away. Every member of our party had a different idea of what the call resembled—from the chopping of trees in a dense forest to a distant pile driver. During the breeding season, this call is a challenge between males and is constantly heard. At other times of the year they seem just to enjoy making the call. Anchored in a narrow "doghole" in East San Benito, we aboard the *Marviento* were surprised to find that young male elephant seals loved to float in a deep sea-cave giving the call where the sound echoed. A half dozen continued the trum-

Mama's milk is so rich that this baby seal will soon be too fat to move around.

peting during the entire three or four days we were there.

Females are about one-third the size of the males, lack the overdeveloped "trunk," have large, beautiful eyes, and are not heavy-bodied. They do not "snort" or "trumpet" but do have quite a vocabulary, and, approached too closely, they open their mouths very wide and exhale with a rasping, hissing sound. Sometimes it sounds like a prolonged belch. Young pups bark, yelp, and squeal. Perhaps the world's most impressive snore is that of a large sleeping bull elephant seal. Elephant seals take very deep breaths, then close their nostrils and hold the air sometimes as long as seven minutes, after which they exhale with a blast of air which, when released through 16 inches of relaxed proboscis, produces a really awe-inspiring snore. An elephant seal beach on a normal day gives rise to a cacophony of sound—grunts, groans, belches, hisses, squeals, snorts, trumpets, and roars!

At the time of our visit in late January, the breeding season was well along. The serious battles between males for harem rights had been going on for some time, and each of the dominant bulls had a group of females surrounding him. Every harem was surrounded by a peripheral group of disgruntled males, and only constant vigilance of the harem master prevented his females from being taken. Every few minutes an outsider would challenge; the harem bull would answer and start laboriously to meet the challenger. Usually the latter would lose courage and retreat, but occasionally would hold ground, and the two would rush up to each other, rear high in the air with mouths open, trunks folded back, and teeth bared, and make rapid passes at each other's head and neck. The skin of the bull's chest is very thick and almost plate-like as a result of scarring and callousness from this dueling. The trunks are often injured and torn, and many of the larger bulls are blind in one eye because of this constant fighting. Usually the challenger was driven off into the sea, sometimes followed by the infuriated harem bull. This was what the peripheral bulls were waiting for, and they would move into the harem. The females of the harem seemed to feel no loyalty, and we observed one accept three different bulls.

In small isolated harems, it was easy to see and understand the social behavior of the family group. On the larger beaches, the harems were crowded together, and the activities of the animals were very confusing.

The pups had just been born at the time of our visit in January. At birth they were black, thin, and about four feet long. They had high-pitched cries and barked like fox pups. They were always busy nuzzling the nearest adult, male or female, looking for a nipple. The incredibly rich seal milk made them gain weight so rapidly that they were soon too fat to move. Apparently they more than doubled their birth weight, about 90 pounds, in the first few weeks of life.

The life of a young pup is precarious because of the breeding activity being carried on in the harem. The huge males, when answering a challenge or pursuing a female, often crush the young pups in their paths. I saw two infants killed this way in one afternoon. The mothers would cry and bark at the males when they rolled over their pups, but their efforts were in vain. Carcasses on the beach indicated that perhaps as many as 25 per cent of the newborn pups in the more crowded harems were killed by being crushed.

The breeding season apparently extends over at least three months. After that time nearly all the adult males retire to special beaches, while the females, their young, and the immature males inhabit other areas. This would explain the reports that all males or all females and young were seen at specific places. In April, 1948, we spent some time observing the elephant seals at a beach north of the landing at North-East Anchorage. At that time, there were only one or two large males with the group of some five hundred animals, while the population on Elephant Beach on the other side of the island was all adult bulls. In early February of this year, the former beach had a population of about sixteen hundred, with a large percentage of adult males, while the B.O.Q., as we called Elephant Beach, was nearly deserted.

The males apparently do not feed during the breeding season. They come ashore prepared with a layer of blubber several inches thick which decreases until the old sealers reported that at the end of the season it was often only two inches thick.

Elephant seals are playful and spend hours in compact groups sporting in the surf. At North-East Anchorage, the bottom drops off so rapidly that we put a large manila bow line ashore to keep from dragging anchor. Each swell pulled the line out of the water. This was observed by a half-grown elephant seal, who proceeded to swim over and under the surging line in an aquatic version of jump-the-rope. Tiring of this, he took the line

Elephant seals love to play—a compact pod is amusing itself in the surf.

in his mouth and rode it up and down as it pulled him half out of the water. The young males are constantly playing at mock battle and trying their new "snorters."

In April many of the animals looked motheaten because of their unique way of shedding. The whole outer layer of skin, including the hair, loosens and sloughs off in large patches. The animals are uncomfortable during this time and are constantly rubbing and scratching to remove the patches of loose skin. The fresh skin covered with gray hair is revealed when the other falls off. The newly "molted" elephant seal is light silver gray in color, with a tan or almost golden belly.

Elephant seals are not graceful on land. Their hind flippers are modified to form a fish-like tail, and the fore flippers are not capable of helping much in land locomotion. As a result the animal has to hunch itself along, in a manner possibly best described as "undulating." On land, they resemble huge squirming worms. In the water, however, they are excellent swimmers, contrary to various reports. While playing in the surf, they look awkward and clumsy as they spread their flippers and roll about in the breakers. But in the open water they fold the fore flippers against their bodies, spread the joined hind flippers, and swim with a lateral motion of the whole caudal area, as a fish does. They can swim very rapidly, always completely submerged when in a hurry.

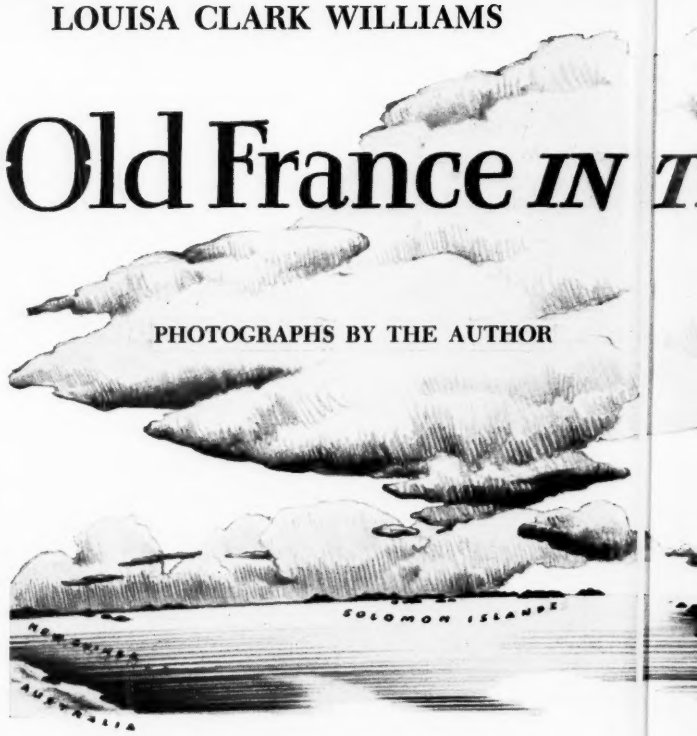
We can hope, and even expect, that one day soon we may find a colony of elephant seals frequenting one of our beaches. Carl Hubbs and Connie Limbaugh, a graduate student at the Scripps Institution of Oceanography, both met adult elephant seals while diving for fish, and the animals were not belligerent. On shore they are not dangerous if the slightest caution is used. That they are unafraid of man is indicated by their use of a beach that is also used by lobster fishermen at San Benitos Island, and by their lack of concern when we visited their herds.

Fishermen here would have to be educated not to hurt them, and severe penalties would have to be levied against those who would molest them on land or in the water. It seems improbable that elephant seals consume fish of economic importance; at least the specimen examined by Huey had eaten only fish of no commercial value.

The return of the elephant seals to California has been a most remarkable comeback of an interesting animal. Welcome to California! END

LOUISA CLARK WILLIAMS

Old France IN T



PHOTOGRAPHS BY THE AUTHOR

NEW CALEDONIA, that long narrow island east of Australia, may have been changed in many ways by the late war. For example, it suffered or enjoyed the hectic benefits of an "American invasion." Admiral Halsey chose this strategic mass of great brown and red mineral mountains, in a delightful Mediterranean climate, as his headquarters. Since it is almost completely surrounded by a wave-proof coral reef — from one to ten miles off shore — in addition to two large, landlocked harbors, it gives almost unlimited sheltered anchorage for ships and seaplanes. Land planes, however, find only one place on the whole island large and level enough for an airfield for all types of aircraft.

Despite war's effects, the general look of this valuable French possession must be unchanged since 1940 when my husband, Dr. Francis X. Williams, entomologist for the sugar planters of Hawaii, and I were there. The same people are there and we hear from them still. The massive, bare or grassy mountains must still have pockets of jungle or high forest along their river slopes. Their lower lands must still be softened to the eye by the indigenous, small, eucalyptus-like paper bark or

N THE SOUTH SEAS

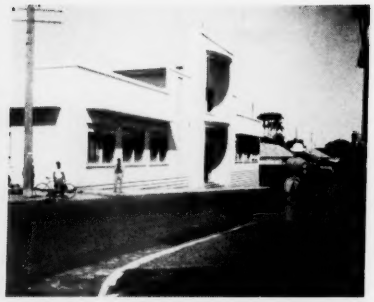
niaouli trees, which spread an endless gray veil shot through with the slender, crooked white of their trunks — crooked and sudden as lightning, they make a shivery, ghostly, old, old kind of forest.

The capital "city," Nouméa, that dreaming bit of old France somehow transported to the South Seas and stranded there, must waken the same wistful memories in anyone who loves a French village. It is indeed such a village, complete with its central *Place* around a sculptured fountain topped with a graceful girl. On the brown and humpy hills behind the town, goats graze sagaciously. Nouméa is unlike French villages, however, for it was built all in about a half century—the second half of the nineteenth century — except for two or three very modern business places such as the Bank of Indo-China. Anyone can see this for himself in the houses so embellished with scroll-work in wood and crude stained glass. It is different, also, in the plants decorating its formal, graveled gardens. The *Place* is roofed by the flaming umbrellas of royal poinciana trees. Hibiscus bushes line the walks. Coconut palms arc gracefully up from street corners.

We went to New Caledonia when the war had already disrupted shipping in that vast watery world and the airplane service had not yet begun. For us, a six weeks' voyage via Samoa, Fiji, New Zealand, and Australia (far south at Sydney) was needed to take us there—a precarious journey, as it turned out. The next scheduled ship to ours from Honolulu was torpedoed off New Zealand. The next little coal freighter to ours from Australia to Nouméa disappeared with its valuable coal, important documents, and the important nickel-smelting official who carried those documents. The crew was found months later marooned on Nauru Island, far to the north. We, ourselves, were delayed two weeks in Sydney by the fall of France. But we flew home to Honolulu in three safe and easy days.

Thus in our own persons we stepped across a dividing line between the past and the future,

Ferns and factories—
Nature and man, modern European man, at least, contrast sharply in New Caledonia. The smoke of Nouméa's nickel smelting plant rises from land built out into the harbor. Ore barges lie between the fill and an outlying part of the city. Part of the harbor and one of its two narrow entrances are beyond.



Industrial management and jungle magic—
From the modern office building of the nickel plant it was not far to the high mountains hiding the low, circular hut of this hermit "sorcerer" of the Ouaté tribe. Crouched naked among his dogs when we saw him, whiskers tied over head, the old man retired to dress for his picture. He came out with pendant sidechops, red bandanna, malu (skirt), huge ax, and fierce pose. The Spanish-moss beard probably had ceremonial uses.

Old housing and new—
↑ Circular walls of cork-like niaouli bark and conical grass-thatch roof made the native dwelling until French laws forbade it. This "chief's house" is preserved as a curiosity; not a television aerial, the carved wood device (wood carving is about the only primitive art in the island) atop the hut is a chief's "tabu" or symbol of authority, usually a stylized human mask.
→ Artistic expression, in the form of fine medallions in color, now shows on the rectangular sides of the required new-type dwelling with its wattle-and-mud walls, its doors and windows, and gable roof of the niaouli bark. Wide eaves, supported all around, usually protect the mud walls and form a pleasant verandah. Plain blue paint is used freely. The houses cluster in irregular but tidy little villages.

even though our journey of exploration was only mildly complicated by hazards compared with journeys of such explorers as Marco Polo and Columbus. Throughout the limitless past ages, men have adventured into and explored remote places of the earth at high cost in tedious, hazardous, long journeys. In the limitless future, which is with us already, no place on the surface of the earth is remote.

Leaving most of the story about New Caledonia to the accompanying photographs, we trust that a few brief facts will be enough to supplement them, facts gathered in 1940.

New Caledonia is 248 miles long and averages 25 to 30 miles wide, being somewhat larger than Massachusetts. Discovered in 1774 by Captain Cook, this imposing jumble of high, massive, closely packed mountains was named for similarly mountainous Scotland. New Caledonia, however, is just within the tropics; its namesake is near the Arctic Circle. The climate is slightly warmer than San Diego's and slightly cooler than Hawaii's. Its sky and ocean are, most of the year, a brilliant blue like that of the French Riviera. It was annexed by France in 1853 for use as a penal colony,

New faces and old—

↑ Among native villagers living near the main auto road running the island's 250-mile length and quite used to strangers, are many with softly curling hair and other Caucasian features.

→ Her name was Mignon. She was a general helper and wore an old-fashioned holoku like other native women in New Caledonia. In fact, she probably wore several holokus to keep warm in the high mountain lumber camp where she served us. She scarcely glanced at the francs we tipped her with, not knowing much about money. But a gaudy "bon voyage" fruit basket kept her up most of the night trying to figure out how it was made. Next morning she asked me to get her six more—they would be so useful to carry her midwife equipment from village to village

"New Caledonian natives share with Australian aborigines the honors of superlative ugliness, but that, of course, is mere prejudice based on quaint western notions of beauty. To anthropologists, the New Caledonians are magnificent . . . contain a larger component of the Australoid . . . element than any other racial group in Melanesia" (D. L. Oliver: The Pacific Islands, *Harvard, 1951, p. 227).*

Old ways of farming—in the hands of skilful Stone Age agriculturists—were maintaining a much larger number of indigenes (Melanesians) when the French seized their land a century ago, than the present remnant of some thirty thousand. Long before the white man came, these irrigation engineers terraced many hillsides for water-grown taro, their staple food; they led water from mountain streams gently back and forth from top to bottom of the steep slopes. Pushed back into upland reservations despite occasional fierce resistance, these spirited people have never submitted to coolie labor for European overlords, but after giving up their struggle they "were permitted to live their own lives and set their own rate of depopulation" (Oliver, op. cit.); they have little place in modern New Caledonian economy.

NOTE: *All photographs are by the author unless indicated otherwise. Grateful acknowledgment is given to the Experiment Station of the Hawaiian Sugar Planters' Association for supplying the excellent camera and photographic materials used for these photographs.*

Design in wood and stone—
▲ New Caledonian native sculptors carve little else but masks; this figure is one of the few exceptions. (Ventrillon, Nouméa)
➔ The abundant petroglyphs of various designs have been studied considerably by French archeologists. One authority, M. Oriol, concludes they are the work of a people who lived in New Caledonia before the present Melanesians.

a use discontinued in 1894. Then France fostered free colonization vigorously. More recently, indentured labor has been brought in from Java, Indo-China, and Tonkin. Today even that has been stopped.

This great island, the top of a very ancient sunken mountain range, is so rich in minerals that we can say with some truth that all the mountains are capped with nickel and ribbed with chromium and iron. It is, in fact, a major source of nickel for the world and an important source of chromium. It has, besides, merchantable amounts of cobalt, copper, lead, and platinum. The nickel is mined by simply slicing off the mountain tops, a thoroughly healthful occupation. The red-orange mineral soil, bared high up against the intensely blue sky, makes the nickel mines a conspicuous and even a beautiful part of that tumultuous landscape.

British, French, and American interests controlled the mines. In 1940, the Japanese worked an iron mine there, also. French convict labor worked the mines first. In 1940, the indentured Asiatics did this work. Today, so our friends write, the labor situation is chaotic and expensive. Near Nouméa, a thoroughly modern smelting plant reduces nickel ore from around 4 per cent to 77 per cent concentrate. Coal for smelting must be brought from Australia.

Cattle raising and beef canning created another major industry. Colonel Dix, an Englishman, had a very large cattle ranch or "station" which extended from mountain tops to the ocean. Fuzzy haired Melanesians were willing, skilful cowboys for him. His cannery, right on the ranch, was a marvel to all local housekeepers, whether white or of darker coloring. "Not even a fly is allowed in there," they remarked with awe.

Production of coffee and copra were other major industries. Both *robusta* and *arabica* coffees were used and they were grown in the shade. Though the climate is good for these crops, the proportion of land level enough for agriculture is small. Melanesians raised their own food crops —bananas, taro, papayas or pawpaws, and some melons, beans, and greens. Oranges, lemons, and guavas grow wild.

If you should be planning a winter vacation in the summer of New Caledonia, be sure to advise your wife to take her smartest wardrobe. New Caledonia is only a step from Paris by air in time and in its thoughts. Most of the ladies there have, in fact, just come from Paris. All of them are French to their fingertips. END

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Factories and ferns— Dr. Williams enjoys collecting once more in the sunlit ferns before our last sunset over Nouméa. A speck in the harbor beyond the smelter spit is the Pan American clipper, just taxiing toward its base on Ile Nou, that will fly us home to Honolulu.

America's trees

A NATURAL HISTORY OF TREES *of Eastern and Central North America.* By Donald Culross Peattie. Illustrated by Paul Landacre. Houghton Mifflin Company, Boston. 1950. xv + 606 pp., 163 line drawings, end-paper map in two colors. $5.00.

Donald Culross Peattie modestly titles his latest work *A Natural History of Trees.* It is much more than just a natural history of trees, actually covering the botany, ecology, ethnology, history (both human and natural), romance, folklore, and economic uses of those trees found in eastern and central North America. As a matter of fact, it just about covers everything an ordinary person might want to know about any tree in that area. It could well be called "an encyclopedia of trees" written in that delightful style so characteristic of its author. For collectors of Peattieana, it is a superb culmination of his life work (the publishers announced this as the first of a Peattie series dealing with *all* our American trees), and will prove a valuable and unique addition to their libraries.

For amateurs wishing to identify the trees about them, Peattie has included a general key to the species based on mature foliage. He precedes this key with elementary instructions in its use so that no one should have difficulty identifying any particular specimen. A profusion of sketches makes this identification doubly foolproof. Both the botanical and English names (with synonyms) are given in separate indexes; there is a comprehensive glossary of botanical terms.

Being a good botanist, Peattie covers all of these technical matters completely and with scientific accuracy, but in simple and untechnical language that most amateurs can understand. With those aspects properly cared for, Peattie the writer of natural history and the romance of history takes over and gives us the human side of our wooded resources—what our forests have meant to the development of our culture and mores, and what man is doing for their preservation. It is in this type of writing that Peattie excels, and it is in this respect that *A Natural History of Trees* differs from other books on plants and trees.

Trees have always played a vital part in the lives of men. On this continent, our forefathers found them a limitless barrier to their progress and expansion. Today, our whole economic structure depends on the conservation of these dwindling forests—our greatest renewable natural resource. It is this human relation that Peattie stresses throughout the book. Each tree has a part to play in the national drama and thus becomes a partner in our "democratic way of living."

Thumb through this book, say to the oaks (and you may be astonished to find how many there are and how different they can be), and read how they have entered into every phase of our history. You will find that they take on new significance and become friends ready to greet you and tell you their ancient legends and stories. So with the beeches and the poplars, the pines and the firs, and all of the other living monuments in our wilderness areas.

It is to these living beings and groups of beings that Peattie introduces us, unfolding the intimate narrative of their battle for a place in the sun. Under the spell of his enthusiastic pen, these wooden logs, inanimate fodder for the mills, are transformed into fellow creatures fighting for survival in a world bent on their destruction.

For scientific writers, national economists, and casual readers, this volume is a necessary reference work. For conservationists and nature lovers it is a must. If I were to have but one book on trees, this would be it.

OLIVER KEHRLEIN

San Francisco

An appreciative word must be said about the format and especially the illustration of *A Natural History of Trees.* Its attractive binding and well-designed title page and text pages are enough to give pleasure in ownership; the end-paper map is artistic as well as informative cartography. But the crowning delight of this book to one who loves fervently both trees and books is the beautiful work of Paul Landacre. Here is one of our foremost book illustrators and print-makers at his best.

Preparation for this particular commission began unconsciously with the "long summers of his childhood on his grandfather's farm near Columbus, Ohio, roaming . . . through 'the big woods' and 'the little woods' "; it continued with scientific studies at Ohio State University. With no time for art classes, he taught himself wood-engraving "by trial and error."

A master of black-and-white techniques (I take this to be scratchboard rather than the wood-engraving for which the artist is noted), Paul Landacre shares the author's knowledge and love of trees. He has proven (as Bewick and Audubon and Rungius did) that scientific illustration can be art. And perhaps trees, and their leaf-, flower-, and fruit-bearing branchlets, are even better models for the artist than birds and animals. There is a quality of design in any casual spray of foliage that is magic on a book page, and Landacre's best is in these crisply accurate close-ups —I like them better than his full-page portraits or habitat "views" which, though instructive and well-composed, have a slight stiffness. Of the others, a few lose, to my taste, by being framed within a circle or ruled lines—but these are picayune criticisms.

For dynamic design in nature superbly rendered in a graphic medium, look at the sweet buckeye on page 480; the persimmon, 538; any of the oaks (except the one unhappily circled); the conifers—most all the rest, in fact (the examples merely reflect my own taste

for the bold rather than the delicate). Look at any half dozen and—you, too, have the graphic arts bug?—resist buying the book if you can! D.G.K.

Landscapes under the sea

MARINE GEOLOGY. By Ph. H. Kuenen. John Wiley & Sons, Inc., New York; Chapman and Hall, Ltd., London. 1950. x + 568 pp., 2 plates, 246 figures. $7.50.

In the important new field of "Marine Geology" (or "Submarine Geology") new facts and features extremely significant to the science of geology are rapidly being brought to light. Many of these discoveries necessitate modification, and in some cases, complete revision of classic concepts of geology. As a result there is an urgent need for the synthesis and presentation of the many new data in a form readily usable by students and professionals in geology and allied sciences. This book, the second* to appear in this field utilizing the information obtainable by present-day techniques, is written by a leader of the modern European group of investigators of this subject.

Dr. Kuenen is professor of geology at the University of Groningen in Holland, and is director of the Foundation for Marine Geology at that University. Early in his career he was geologist of the Snellius Deep-Sea Expedition in the Moluccas and afterwards rapidly assumed a position of leadership among the European investigators in this field. Dr. Kuenen has specialized on the marine geology of the East Indies and the features which are of special significance in that area; in consequence his book tends to overemphasize the features and characteristics of that region. One chapter is concerned with "The Indonesian Deep-Sea Depressions," and another chapter is on "Coral Reefs," with most of his data for the last named chapter being derived from the Indonesian area also. Thus two out of the eight chapters of the book are primarily concerned with data and conclusions principally derived from a relatively small, even though highly diverse, area. In contrast, nowhere in the book is any particular attention given to areas of the seabottom in middle and high latitudes, despite the fact that, areally at least, they are considerably more important than the regions which he considers in detail. Part of this neglect is because information on these regions is less available, but even so he does not seem to have used all the data at hand.

Dr. Kuenen nevertheless has done an excellent job in emphasing problems and relations of the sea floor, particularly of the low latitudes. The numerous illustrations are well drawn and to the point and his command of the English language is very good. The discussion of the "Coral Reef Problem" is excellent. Kuenen concludes that a combination of "glacial control" and subsidence (relative) offers the best explanation of coral reefs and presents very critical analyses of much of the available evidence, showing that in many cases no other known hypothesis is adequate.

Some 40-odd pages of chapter seven deal with the intriguing subject of "Submarine Canyons." Kuenen shows that most of the canyons were apparently formed during the Pleistocene and presents evidence which he feels indicates that they were most probably excavated by turbidity currents during the time of lowest sea level (or maximum glaciation). He feels that turbidity currents were much more active at the time of maximum glaciation than at present. However, he points out that some canyons have been eroded from well consolidated sedimentary rocks, and at times even igneous rocks, and that there are serious doubts as to whether turbidity currents have sufficient erosive power to carve canyons out of rocks of this type. The reviewer feels that no hypothesis yet brought forward provides an adequate answer to this problem.

Kuenen shows that "Permanency of the Continents and Oceans" in the classic sense can certainly not be accepted. There is evidence during several epochs of geologic time of sediments being derived from offshore land masses (where oceanic depths now exist) in both the Atlantic and Pacific basins, thus indicating that extensive borderlands at least, must have foundered into the oceanic depths. Kuenen is also opposed to "Continental Drift." Much of the detail about the ocean floor that has accumulated in recent years does not fit into any of the theories of "drift" and further, with respect to Indonesia, supposedly an area where "drift" works very well, he says "the survey just given shows that Indonesia, far from giving eloquent testimony in favor of Wegener's views, as some authors have held, presents many features strongly opposed to the theory of drift. Only by assuming the admittedly far fetched reconstruction outlined above can a flat contradiction be avoided."

All in all this is an excellent text and reference work to be highly recommended to the nontechnical but interested layman as well as the professional geologist. It is a noteworthy event to have this book, written by an outstanding European geologist, published in America where it will be readily available, along with the texts and reference works of American authors. It is highly stimulating to the science to have the viewpoint, methods, and techniques of people trained in other lands brought to our attention.

J. Wyatt Durham

Museum of Paleontology
University of California
Berkeley

*The first: *Submarine Geology* by F. P. Shepherd, 1948.

Insects and men

INSECTS IN YOUR LIFE. By Dr. C. H. Curran. Sheridan House, New York. 1951. 316 pp., about 50 photographs, half-tone and line drawings. $3.50.

The curator of insects and spiders in the American Museum of Natural History has collected between covers a number of popular essays and articles he has tossed out from time to time in the hope of making the public less apathetic about insects and their closest relatives. In general, these pieces make enjoyable reading. Now and then one becomes a bit conscious of dullness and repetition—didn't he say the same thing in an earlier chapter?—which could have been avoided by more careful editing and less effort to bulk the book. In spite of these criticisms, this is a good deal of authoritative information about many of the commonest, and most pestiferous, *Insects in Your Life*, and mine, and what we can do about some of them; about insects in folklore and as food; about their ways of protecting their eggs; and many other facts about their life and how they affect ours. There is timely advice about DDT and the dangers of using it indiscriminately and without knowledge based on research in its applications.

It would be unfair not to mention a chapter on "The Woolly Bear Caterpillar," an amusing account of some earnest research undertaken by the author and a story-minded gentleman from the *New York Herald Tribune*. It started with a farm boy's remark to Dr. Curran that the woolly bear could predict the winter (publishing his prognostications to all who would read them in the varying widths of his alternate black and red bands). Well, who could call this mere yokel superstition until a statistical number of "bears" be read in a scientific number of annual samplings? Unpredicted by-product of research was the reaction of motorists to the samplers along the public roads—"they thought we were nuts." Just entomologists at work. Quite harmless. D.G.K.

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The larger birds

AUDUBON WATER BIRD GUIDE. By Richard H. Pough. Doubleday and Company, Inc., Garden City, New York, 1951. 352 pp., 623 illustrations (485 in color) of 258 species. $3.50.

This excellent field guide, published under the sponsorship of the National Audubon Society, treats especially of the "water, game and large land birds," excluding the confusing array of small birds that usually dominate the pages of bird guide books. Each species is depicted in one of the handsome color plates by Don Eckelberry, and many are further illustrated in flight by ink sketches, drawn by Earl L. Poole. The text is arranged under the following headings: Identification, habits, voice, nest, and range. The author, a national figure in ornithology and conservation, is careful to write for the amateur, though the volume will be of value to the professional worker as well. Unfortunately, however, the book only covers eastern and central North America (to the western edge of the Great Plains), and though many Western species are included, it is incomplete for the Rocky Mountain and Pacific Coast regions. A. Starker Leopold

Museum of Vertebrate Zoology,
Berkeley, California

For outdoorsmen

FISHING AND HUNTING MAPS AND DIRECTORIES FOR CALIFORNIA, published by C. E. Erickson and Associates, Berkeley 9, California. 1950 and 1951.

Erickson's Directory of Inland Fishing Waters of California. 68 pp. $1.00.

Fishing-Boating Atlas, San Francisco Bay and Delta Areas. 16 pp. 60 cents.

Steelhead - Salmon Fishing Atlas, Northern California Streams and the Rogue River, Oregon. 16 pp. 60 cents.

Colorado River Fishing-Hunting Atlas, Lake Mead to Yuma. 16 pp. 60 cents.

Outing Map of the Trinity-Klamath Region. 12 pp. 50 cents.

Outing Map of the Feather River Region. 10 pp. 50 cents.

Outing Map of the American River-Tahoe Region. 11 pp. 50 cents.

Outdoorsmen are constantly on the lookout for accurate, detailed maps of their fishing and hunting grounds. C. E. Erickson, the ingenious compiler and cartographer of the above publications, offers such guidance to any who are willing to pay from 50 cents to $1.00. To one who has ever been lost looking for a "Silver Creek" or an "Old River," the time saved will be well worth the cost. The maps are as good as can be obtained anywhere, and the additional margin notations and summarized data on fishing and hunting regulations, tide tables, etc., are of further value. A.S.L.

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Birds in Their Homes. **Sabra Mallett Kimball and Addison Webb. $2.00.**

West Coast Shells. **Josiah Keep. $3.75.**

A Field Guide to Western Birds. **Roger Tory Peterson. $3.50.**

Mammals of Lake Tahoe. **Roert T. Orr. $4.00.**

A Dipper Full of Stars. **Lou Williams. $2.50.**

The Modern Aquarium. **William T. Innes. $1.00.**

North American Game Fishes. **Francesca La Monte. $3.00.**

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"What competition is there among major oil companies?"

Harry F. Wood, attorney of Olympia, Washington, writes: *"What type of competition does actually exist among the major oil companies? Price? Service? Research? If it's research, we should find one company's brand of oil, for example, gives better engine protection."*

Harry F. Wood

The answer to this question is much the same for the oil industry as for most others. Competition is intense in *all* operations. In oil, operations may be grouped under four broad headings...

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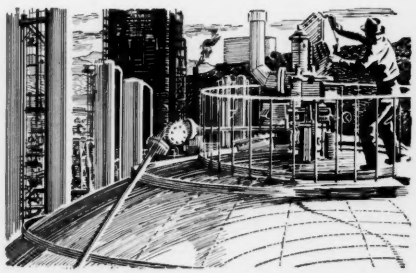
You may have heard that a suit has been filed by the Antitrust Division in Washington to break up Standard of California as well as six other big oil companies which are in business on the West Coast. Already hundreds of people have written us protesting this action. Many have asked pertinent questions. We believe we should answer these questions for everyone. And we take this way of doing so. If you have a question, we urge you to write us at this address:

"I'd Like to Know"
225 Bush Street
San Francisco 20

Competition starts in production, getting crude out of the ground. Oil companies (both large and small) first explore, then bid for rights to land where oil may exist. Competition in efficiency then begins. Ways must be found to make wells produce at costs low enough to meet market prices.



Competition continues in refining. Again each company must make the operation pay. A plant must produce products as good as or better than those of other refiners, at prices as low as theirs or lower. No company can keep customers with products either not good enough or too expensive.

Competition in research exists indeed. That's why *two* gallons of today's gasoline, for example, do the work that took *three* a generation ago. A company must keep pace or lose out. As for differences between brands of oil: atomic energy is now being used to measure engine wear as it occurs. It reveals our new motor oil reduces wear as much as one-half, as compared with conventional oils.

And competition shows up clearly where our products are *sold*. This does, in part, take the form of *service*. (Wherever you find Chevron gasolines, you find a man making good on our promise, "We take better care of your car.") But it's also competition in *price*. To get and hold business, every seller must maintain quality in products and service, and hold his prices down to meet others.

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